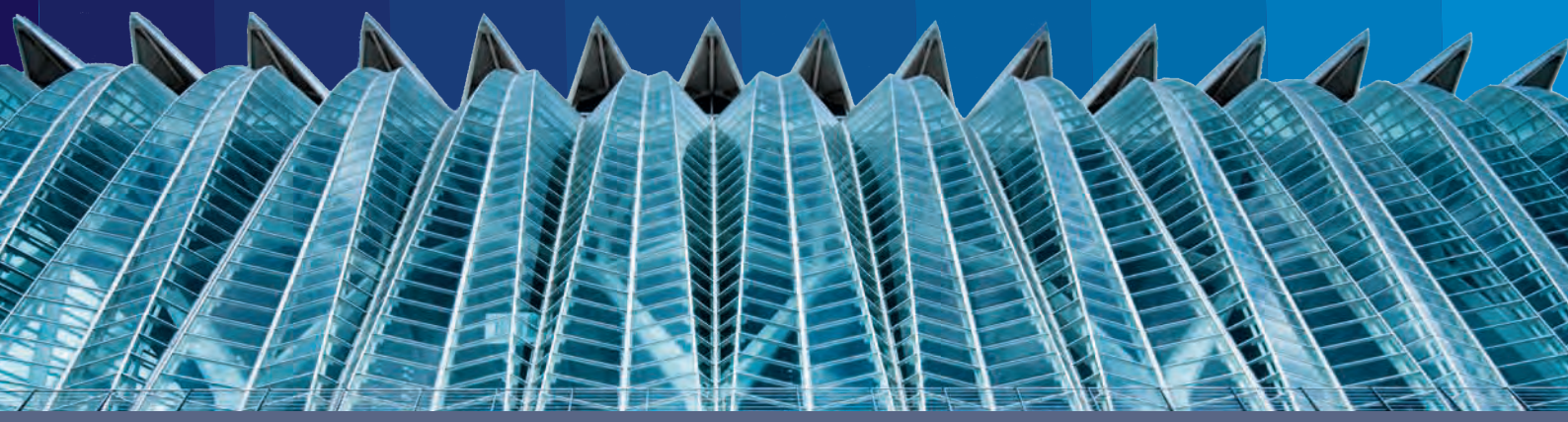
INTED 2018

12th International Technology, Education and Development Conference

5-7 March, 2018
Valencia (Spain)

CONFERENCE PROCEEDINGS



Rethinking Learning in a Connected Age

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FORMATIVE EVALUATION IN HISTOLOGY PRACTICAL CLASSES

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Abstract

Human Histology is a second-year compulsory subject of the Medicine Degree at the Universidad Complutense de Madrid. Practical is focused on observation of histological slides to train students in recognizing general and differential microscopic characteristics of organs, laying the foundation for Pathology learning in the third-year. The Bologna plan involved a dramatic reduction in the number of practice hours, which along with the main role of the students in the European Higher Education Area, highlight the need to implement the practical part, particularly methodologies and the evaluation system. Teachers have been required to dedicate more time and effort for creating educational materials, designing individual or group tasks and learning virtual platforms environments. Students have taken an active role with works, presentations and peer-evaluations.

Nevertheless, seven courses after the introduction of the new medical curriculum, it has become evident that a large proportion of students does not use practical scripts nor consult the recommended bibliography, and so they go to practical sessions without knowing aims and tasks. In order to boost practical and to achieve a more effective work in the classroom, *minitests* were included in each session. They consisted of short tests with projected images asking for the organs, their histological features and staining techniques.

Minitests were planned at the beginning of each session. Participation in the *minitests* would be voluntary but teachers graded them. Provided a continued participation, the *minitests*' grades could result in one extra point, but a final exam mark 7 out of 10 is required for adding the extra bonus. Therefore, only those students who demonstrate a good knowlegde in the final exam would benefit from the *minitests*' mark. A *Minitest Survey* was set up at the end of the practical part to find out the level of satisfaction of the students. The following course, *minitests* were moved to the end of each session, that's it, after the observation of histological slides under the microscope. This time, instead of the *Minitest Survey,* some questions were added to the *Final Survey* conducted at the end of the term.

Appraisals on continuous evaluation with *minitests* were clearly satisfactory. A large proportion of respondents in 2015/16 asserted that *minitests* forced them to prepare practical (90%), that they provide for a better understanding of microscopic observations (86%) and that they help to figure out the aims of each session (81%). Satisfactory opinions were once again collected in 2016/17: 86% of respondents rated *minitests* as good or very good, and 84% were satisfied with *minitest* continuous evaluation. When asking if minitests would help to improve their final practical mark, 61% agreed in 2015/16 and 79% in 2016/17. Cross-checking these opinions with real marks proved that 70% of the group improved the practice mark due to minitests bonus extra in 2015/16 and 85% in 2016/17. Those who most benefit (maximum score +1 point) rose from 28% to 65%.

Our main goal at practical was not to reduce the failure rate but to enhance learning. Minitests have become a driving force. Students are much better at organizing practical time and show a willingness to learn integrating images with theoretical concepts which should result in a formative learning.

Keywords: Higher Education, Histology, practical learning, continuous evaluation, formative evaluation.

1 INTRODUCTION

The Spanish University has gone through deep changes in the last decade due to the convergence of the European Higher Education Area (EHEA) and the establishment of new curricula. With respect to the methodologies, more participative methods are beginning to emerge based in the knowledge building as Problem-based Learning (PBL) [1,2] and *flipped classroom* [3,4]. Without dismissing traditional evaluation, evaluation has also evolved allowing other systems such as self-, peer-, and group evaluation [5]. In 2006, Murphy [6] pointed out that evaluation fulfill a regulatory function of

learning since students make decisions based on the type of evaluation they should face. Likewise, Margalef [7] noted that formative evaluation goes beyond ratings or measuring knowledge acquired.

Histology practical aims to train students in identifying cells and tissues, in understanding 3D structure of organs from bidimensional images, and in integrating theoretical concepts with microscopic images obtained by different techniques [8]. Furthermore, histological knowledge of Medical or Biomedical Science undergraduates should target relevant clinical issues.

Human Histology is a second-year compulsory subject of the Medicine Degree at the Universidad Complutense de Madrid (UCM) [9]. Its practical part is focused on sessions of histological slides observation so students learn to recognize general and differential microscopic characteristics of organs, laying the foundation for Pathology learning in the third-year. The Bologna plan involved a reduction in the number of practical hours, from 60 to 27, which, along with the main role of the students in the EHEA, highlight the need to implement the practical part. As a result, important changes have been addressed both in methodologies and in the evaluation system [10]. Teachers have been required to dedicate more time and effort for creating educational materials, designing individual or group tasks and learning virtual platforms environments. Students have taken an active role with works, presentations and peer-evaluations, and the work made outside of class (36 hours of distance learning) is now taken into account when evaluating the students [11]. In short, the final exam is no longer the only way for evaluating, since attendance accounts for 10% and a collaborative work for 60% of the total mark.

Nevertheless, seven courses after the introduction of the new medical curriculum, it has become evident that a large proportion of students do not uses practical scripts nor consult the recommended bibliography, and so they arrive at practical classes without knowing aims and tasks, except for those who make a presentation. In order to boost classes and to achieve a more effective work at the classroom, *minitests* or short tests with projected images were included in each practice. Participation in the *minitests* would be voluntary but when continued, participants who passed could obtain an extra bonus to improve their final mark.

We present in this paper the experience carried out in two consecutive courses and the students' opinions.

2 METHODOLOGY

Prior to the practical sessions, students may consult educational material such as scripts and links to several iconographic and bibliographic resources, and the file with the presentation made by some classmates and uploaded 48 hours before each practice session.

In 2015/16 the *minitests* were planned at the beginning of the sessions. Then, one or two students made an introduction of the practical before the observation of histological slides under a microscope. The *minitests* were voluntary but graded and consisted of short tests with projected images asking for the organs, their histological features and staining techniques. Provided a continued participation the *minitests*' grades could result in one extra point, but a final exam mark 7 out of 10 is required for adding the extra bonus. In other words, only those students who demonstrate a good knowledge in the final exam would benefit from the *minitests*' mark.

A *Minitest Survey* was set up to find out the level of satisfaction of the students. Four of the 22 questions were about practical preparation and 16 about the *minitests*. In these, students should rate several statements from 0 to 3, being 0 Totally Disagree and 3 Totally Agree. The survey was achieved at the end of the practical part.

In 2016/17, the short tests were moved to the end of the sessions, that's it, after the observation of histological slides under the microscope. No changes were made in the evaluation system. In this case, instead of the *Minitest Survey,* 11 questions were added to the *Final Survey,* 5 about the preparation of practice and 6 about the *minitests*. In these, respondents should rate from 0 to 4 several statements. The *Final Survey* was conducted at the end of the term.

Both surveys were analyzed with use of Excel and SPS22 statistical analysis software.

3 RESULTS

Experiences were implemented in one group of Histology in two consecutive years. In the first course, the group was formed by 83 students, 66% of which were women. In the second one, the group consisted of 88 students, 74% of them were women. In both cases the group split into two subgroups for practice, but data were processed together.

Minitest Survey was answered by 58 students, which represents 70% of the group. 67% of respondents were women and 91% said they usually made the *minitests*.

Appraisals on continuous evaluations with *minitests* were clearly satisfactory (Fig. 1). A large proportion of respondents Agree (2) or Totally Agree (3): 90% asserted that *minitests* forced them to prepare practical, 86% maintained that they help to a better understanding of microscopic observations and 81% said that they help to figure out the aims of each practical and to maximize time. When asking if the *minitests* were a waste of time, 79% of respondents Totally disagree (0) or Disagree (1). When questioning their validity, 88% of respondents judged they were well-designed and provided a general overview of each practical.

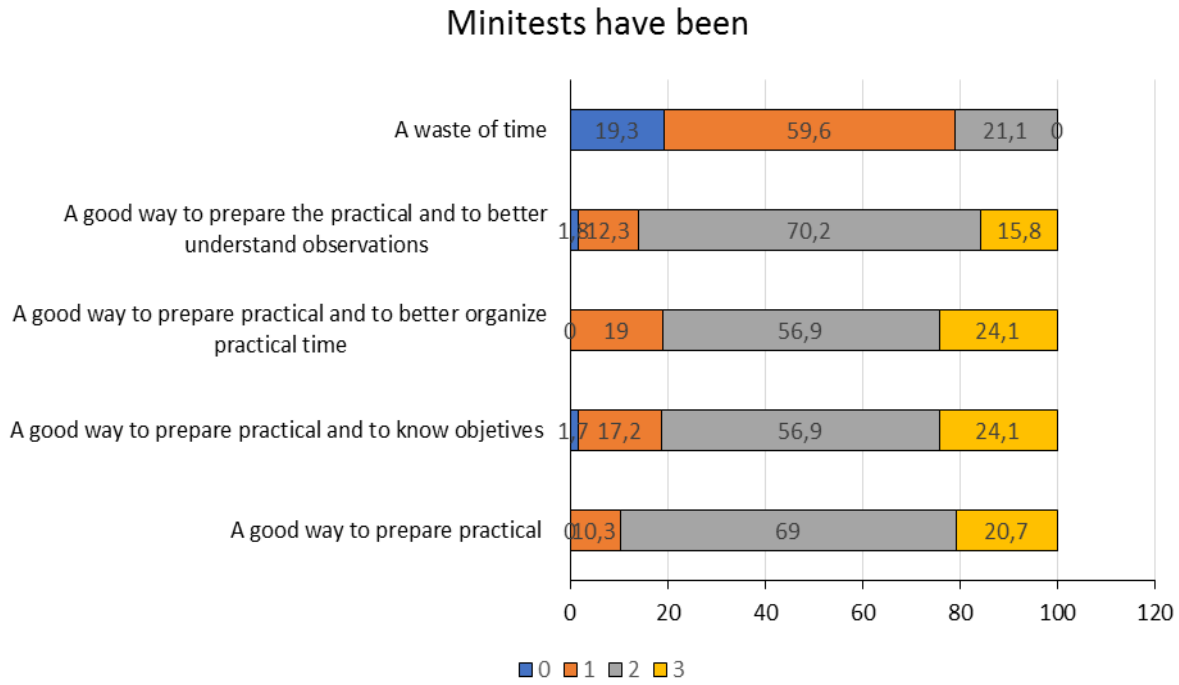

Figure 1. Students' opinions in 2015/16 about minitests (percentages)

The second experience was similar to the first one, but minitests were made at the end of each session. This switch was because 26% of the students that proposed improvements in the *Minitest Survey* suggested to move them to the end of the session.

The *Final Survey* was fulfilled by 74 students, which represent 89% of the group, 76% of them were women. 69% of respondents stated they have made each *minitest* and only 7% said they have made none or just one. Satisfactory opinions were once again collected: 86% of respondents thought *minitests* are Good (3) or Very good (4), and 84% were satisfied with *minitest* continuous evaluation.

Regarding level of minitests' difficulty, 53% respondents of the first course said they felt able to pass them (Easy, 2 or Very easy, 3). In the second course, 44.6% of respondents stated it was easy (3) to pass the minitests. It is remarkable that men and women expressed different opinions and they were statistically significant differences (Fig. 2): 74% of the men but only 42% of the women rated them as Easy (2) or Very easy (3) (χ^2 0.047 and Fischer' test 0.029).

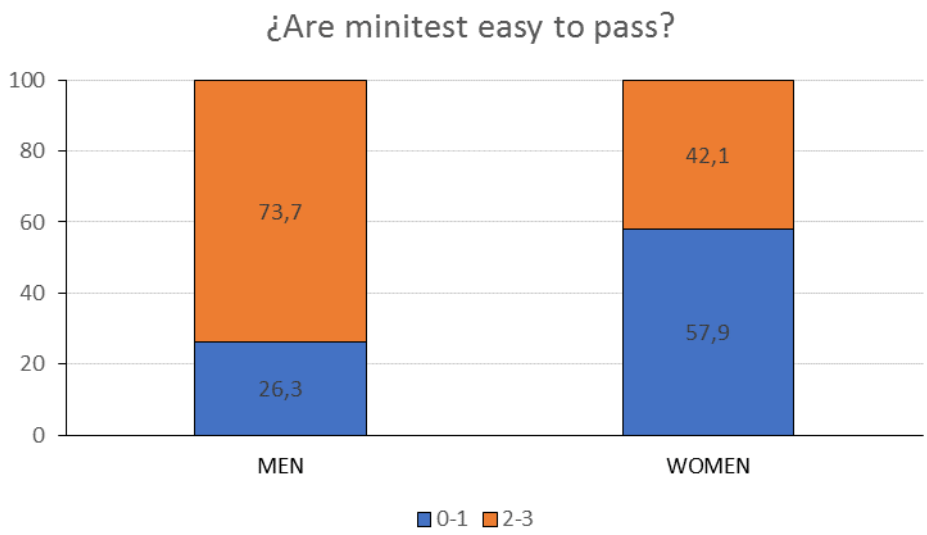

Figure 2. Differences of opinion between men and women in 2015/16 (percentages).

When asked if minitests would help to improve their practical mark, 61% agreed in the first course (Agree, 2 or Totally agree,3) and 79% in the second course (65% Quite likely, 3 and 14% Highly likely, 4). Cross-checking these opinions with real marks prove that 70% of the group improved the practice mark due to minitests extra bonus in 2015/16 and 85% in 2016/17. Those who most benefit (maximum score +1 point) rose from 28% to 65% (Fig. 3).

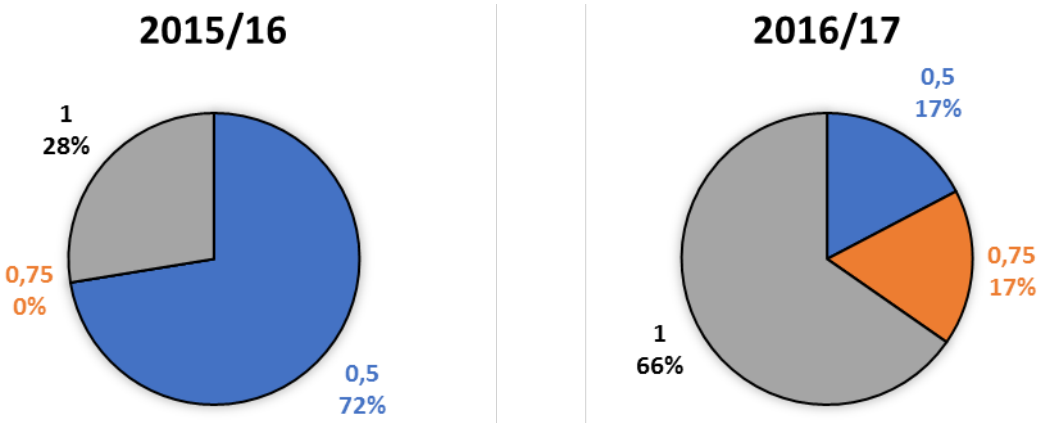

Figure 3. Student ratios according to minitest extra bonus

4 CONCLUSIONS

Final Practical exam is not a difficult test and so it is announced at the beginning of the term. Even so, final exams are usually considered as risky situations and most of students prefer continuous evaluation systems that are perceived as fairer.

Our main goal at practical was not to reduce the failure rate but to enhance learning. We need to motivate students so they come to practical to make good observations under the microscope. *Minitests* have become a driving force. Students show willingness to learn, are pro-active and responsible and much better at organizing practical time. Continuous evaluation provides for indepth evaluation and students are required to achieve a better understanding, integrating images with theoretical concepts. This would provide a good base to face Pathology and other clinical subjects.

ACKNOWLEDGEMENTS

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